COMPLETE LISTING OF THE CLAIMS

The following lists all of the claims that are or were in the above-identified patent application and includes requested amendments under 37 C.F.R. § 1.312.

1. (Original) A polarization control system comprising:

a beam source generating a first beam of light with a first polarization and a first frequency and a second beam of light with a second polarization and a second frequency;

a polarization state modulator (PSM) positioned to receive the first beam and the second beam, wherein the PSM is operable to change the polarizations of the first and second beams in response to a control signal;

an optical fiber coupled to receive the first beam and the second beam;

a detector system receiving a portion of the first beam and a portion of the second beam after the first and second beam exit from the optical fiber, the detector system generating a beat signal in response to the first beam and the second beam; and

a controller that receives the beat signal and generates the control signal for the PSM.

2. (Original) The system of claim 1, wherein the optical fiber receives the first beam and the second beam from the PSM.

3. (Original) The system of claim 1, wherein the PSM receives the first beam and the second beam from the optical fiber.

4. (Original) The system of claim 1, wherein the detector system comprises:

a first detector path receiving the first and the second light beams after propagation through the optical fiber, the first detector path generating the beat signal

a second detector path receiving the first and the second light beams after propagation through the optical fiber, the second detector path generating a second beat signal in response to the first and the second light beams;

a third detector path receiving the first and the second light beams after propagation through the optical fiber, the third detector path generating a third beat signal in response to the first and the second light beams; and

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OF DAVID MILLERS
6560 ASHFIELD COURT
SAN JOSE, CA 95120
PH: (408) 927-6700
FX: (408) 927-6701

a phase detector that generates a phase signal in response to the second and the third beat signals, wherein the controller uses the phase signal when generating the control signal.

5. (Original) The system of claim 1, wherein the beam source comprises a laser.

6. (Original) The system of claim 5, wherein the laser comprises a Zeeman split-laser.

7. (Original) The system of claim 5, further comprising a birefringent plate between the laser and the PSM.

8. (Original) The system of claim 5, wherein the laser comprises a resonant cavity containing a birefringent element positioned such that the resonant cavity has a first optical path length for a first polarization of light and a second optical path length for a second polarization of light.

9. (Currently Amended) The system of claim 5, wherein the laser comprises a master laser that produces a first output beam, and the beam source further comprises:

a slave laser that produces a second output beam having a frequency that is adjustable in response to a second control signal; and

a monitor system operable to measure a frequency difference between the first output beam and the second output beam and to generate the second control signal to set the second output beam at the frequency that provides a desired frequency difference.

10. (Original) The system of claim 5, wherein the beam source further comprises an optical element that acts as a rotating half-wave plate through which a beam from the laser passes.

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11. (Original) The system of claim 10, wherein the optical element comprises:

an electro-optic crystal;

a first drive system that applies a first alternating voltage across the electro-optic crystal in a first direction; and

a second drive system that applies a second alternating voltage across the electro-optic crystal in a second direction.

12. (Currently Amended) The system of claim [[10]] 11, wherein the first polarization of the first beam when entering the electro-optic crystal is a circular polarization, and the second polarization of the second beam when entering the electro-optic crystal is a circular polarization that is orthogonal to the first polarization.

13. (Original) The system of claim 10, wherein the laser is a Zeeman-split laser.

14. (Original) The system of claim 5, wherein the light source further comprises:

a polarizing beam splitter positioned to split a beam from the laser into a first polarization component and a second polarization component; and

a first acousto-optic modulator in a path of the first polarization component.

15. (Original) The system of claim 14, further comprising a second acousto-optic modulator in a path of the second polarization component.

16. (Original) The system of claim 14, wherein the polarizing beam splitter is selected from a group consisting of a birefringent element and a film that is reflective for one of the first and second polarization components and transparent for the other of the first and second polarization components.

17. (Currently Amended) The system of claim 14, wherein the laser is a Zeeman-split laser~~, and the light source~~.

18. (Original) The system of claim 5, wherein the beam source further comprises at least one acousto-optic crystal in a path of an output beam from the laser, wherein at least one of the first beam and the second beam comprises light diffracted by an acoustic wave traversing the acousto-optic crystal.

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19. (Original) The system of claim 18, wherein one of the first beam and the second beam comprises light not diffracted by the acoustic wave traversing the acousto-optic crystal.

20. (Original) The system of claim 18, wherein the acoustic wave comprises a first acoustic component and a second acoustic component, and a difference between the

first frequency of the first beam and the second frequency of the second beam depends on a difference between a frequency of the first acoustic component and a frequency of the second acoustic component.

21. (Original) The system of claim 20, wherein the first acoustic component traverses a first portion of the acousto-optic crystal, and the second acoustic component traverses a second portion of the acousto-optic crystal that is separated from the first portion of the acousto-optic crystal.

22. (Original) The system of claim 18, wherein the acousto-optic crystal has an optical axis disposed at an angle to a direction of propagation of the acoustic wave.

23. (Original) The system of claim 18, wherein the acoustic wave traverses an interaction region in the acousto-optic crystal, and the output beam from the laser is internally reflected within the acousto-optic crystal causing the output beam to traverse an interaction region more than once.

24. (Currently Amended) The system of claim 18, wherein the beam source further comprises:

a first optical system that splits the output beam from the laser into a first polarization component and a second polarization component that are both directed into the at least one acousto-optic crystal; and

a second optical system that operates to combine portions of the first and second ~~polarizations~~ polarization components that were diffracted by the acoustic wave in the at least one acousto-optic crystal and to combine portions of the first and second ~~polarizations~~ polarization components that were not diffracted by the acoustic wave in the acousto-optic crystal.

25. (Original) The system of claim 24, wherein at least one of the first optical system and the second optical system comprises a birefringent optical element.

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6560 ASHFIELD COURT
SAN JOSE, CA 95120
PH: (408) 927-6700
FX: (408) 927-6701